DOCUMENT RESUME

ED 262 875 PS 015 376

AUTHOR Tappan, Mark B.; And Others
TITLE Postformal Adult Cognition: A Multi-Domain Study.
PUB DATE 8 Jun 85
NOTE 19p.; Paper presented at the Annual Symposium of the Jean Piaget Society (15th, Philadelphia, PA, June 6-8, 1985).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Adults; *Cognitive Ability; *Cognitive Development; *Individual Characteristics; *Intelligence Quotient; *Interpersonal Competence; Moral Values; Personality; Value Judgment; Vocational Interests
IDENTIFIERS Moral Reasoning; Personal Experiences; Piagetian Theory; *Postformal Adult Cognition

ABSTRACT

This study investigated forms of adult social cognition in the domains of justice judgment and ethical evaluation and their relationship to IQ scores and personal and vocational interests. Subjects were 150 adult members of the MENSA organization: 69 females and 81 males ranging in age from 18 to 83 years. Each subject completed a battery of instruments designed to measure development in the logico-mathematical and social domains, personal and vocational interests, and IQ, including Commons and Farrell's (1984) formal-operations balance-beam problem; Commons, Richards, and Kuhn's (1982) meta-systematic four-story problem; Commons, Richards, and Kuhn's (1982) meta-cube analogy problem; Kuhn's two-country problem; Kohlberg's Moral Judgment Interview, Form A; Armon's (1984) ideals of the Good-Life Interview; Loevinger's ego-development Sentence Completion Test; The Strong-Campbell Interest Inventory; and standard adult IQ verbal sub-tests in written form, taken from the Wechsler Adult Intelligence Scale. Subjects' scores on the social-cognitive measures were comparable to such scores from other adult populations, and there was little or no relationship between these scores and IQ. The relationship between social-cognitive development and personal and vocational interests indicates that certain vocational personality types were more strongly related to social-cognitive development in the domains of justice judgment and ethical evaluation than were others. (Author/RH)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
X This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

ED262875

Postformal Adult Cognition: A Multi-Domain Study

Mark B. Tappan, Harvard University
Cheryl Armon, Antioch University-West
Dawn E. Schrader, Harvard University
Francis A. Richards, Cornell University
Edwin Farrell, Harvard University
Michael L. Commons, Harvard University

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Cheryl Armon
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

PS 015376

Paper presented at the
15th Annual Symposium of the Jean Piaget Society,
Philadephia, PA, June 8, 1985.

Abstract

Piaget claimed that cognitive development ends in adolescence, with the attainment of formal operations; current research, however, does not support this claim. This study investigates forms of adult social cognition in the domains of justice judgment and ethical evaluation and their relationship to IQ scores and personal and vocational interests. Subjects were 150 adult members of the MENSA organization. Each subject completed a battery of instruments designed to measure development in the logico-mathematical and social domains, personal and vocational interests, and IQ. Subjects' scores on the social-cognitive measures were comparable to such scores from other adult populations, and there was little or no relationship between these scores and IQ. The relationship between social-cognitive development and personal and vocational interests indicates that certain vocational personality types were more strongly related to social-cognitive development in the domains of justice judgment and eithical evaluation than were others.

Postformal Adult Cognition: A Multi-Domain Study

Piaget claimed that the attainment of "formal operations" in adolescence marked the endpoint of cognitive development (Inhelder & Piaget, 1958). The findings of current research, however, do not support this claim. Forms of thought have been found in adulthood that are qualitatively different from those that are found in adolescence (Alexander, Langer, & Oetzel, in press; Armon, 1984; Colby, Kohlberg, Gibbs, & Lieberman, 1983; Commons, Richards, & Kuhn, 1982; Kuhn, 1979; Pascual-Leone, 1980). These forms of adult thought have been given the generic label "postformal" to distinguish them from forms of thought found primarily in adolescence (Commons, Richards, & Armon, 1984; Richards & Commons, in press).

This study investigates "postformal" adult cognition more fully, by focussing particularly on forms of thought in the "cognitive" domain of logical-mathematical-scientific thought and the "social-cognitive" domain of interpersonal, moral, and ethical thought. Previous work in this area has served primarily to construct models or identify forms of adult cognition that can be characterized as postformal. There has, however, been very little attempt either to examine the relationship between postformal cognition in different domains (for exceptions see Commons, Richards, & Armon, 1984; Kramer, 1983), or to examine the relationship between postformal cognition and scores on such standard psychological measures as IQ tests and personal, educational, and vocational interest inventories. The importance of examining the latter relationship is the possibility that personal, educational, and vocational interests and experiences may bear some relationship to the development of postformal cognitive competence.

An additional focus of this study has been to examine whether individuals

who score highly on standard measures of intelligence also tend to attain postformal levels of cognitive competence in one or more domains. Our assumption is that high IQ does not necessarily predict postformal cognitive competence; hence IQ may not be a reliable or valid measure of adult cognitive and social-cognitive development. In other words, our view is two-fold:

1) there is cognitive and social-cognitive development in adulthood in more than one domain; and
2) IQ may not be a reliable or valid predictor of development in any domain.

This study, then, takes a preliminary and primarily descriptive step towards the examination of the following relationships:

1) the relationship between postformal development across various logical-mathematical-scientific and social domains and sub-domains;
2) the relationship between development in these domains and personal, educational, and vocational interests and experiences; and
3) the relationship between development in these domains and performance on standard measures of intelligence.

This paper will report on a small portion of the larger study: namely, the relationship between social-cognitive development in two social sub-domains (justice judgment and ethical evaluation), personal, educational, and vocational interests and experiences, and standard measures of intelligence.

Method

Subjects

The subjects in this study were 150 members of the MENSA organization (69 females and 81 males), ranging in age from 18 to 83 (with a mean age of 45). MENSA members are a self-selected group of highly intelligent people who in this case scored between 125 and 190 on some standard IQ test--two

or more standard deviations above the national average. The subjects in this study volunteered to participate by responding to an advertisement placed in the MENSA Newsletter. Approximately 300 members of MENSA responded to the advertisement in the newsletter.

Procedure

Each of the 300 MENSA members received, by mail, a battery of nine instruments that they were to complete at their convenience (the entire battery took approximately eight hours to complete) and then return to us. The 150 completed batteries represents a return rate of approximately 50 %. The battery contained the following instruments:

1) Commons and Farrell's (1984) formal-operations balance-beam problem.
2) Commons, Richards, and Kuhn's (1982) meta-systematic four-story problem.
3) Commons, Richards, and Kuhn's (1982) meta-cube analogy problem.
4) Kuhn's (Kuhn, Pennington, & Leadbetter, 1983) two-country problem.
5) Kohlberg's (Colby & Kohlberg, in press) Moral Judgment Interview, Form A (MJI-A).
6) Armon's (1984) ideals of the Good-Life Interview (GLI).
7) Loevinger's (1976; Loevinger & Wessler, 1970) ego-development Sentence Completion Test (SCT).
8) The Strong-Campbell Interest Inventory (SCII) (Campbell & Hansen, 1981).
9) Standard adult IQ verbal sub-tests in written form, taken from the Wechsler Adult Intelligence Scale (WAIS) (Wechsler, 1955).

The balance-beam problem is a measure of Piagetian formal operations, adapted from one of Inhelder & Piaget's (1958) original experiments. Commons, Richards, and Kuhn's four-story problem entails a comparison of systems,

two of which are identical in structure. This problem assesses a subject's postformal logical-mathematical-scientific capabilities, as does the meta-cube analogy problem, which assesses postformal reasoning in the geometric domain. Kuhn's two-country problem is similar to the four-story problem in that it also entails a comparison of systems, hence it provides another measure of postformal logical-mathematical-scientific cognitive ability. The Moral Judgment Interview and the Good-Life Interview assess stages of social-cognitive development in the social domains of justice judgment and ethical evaluation (see Armon, 1984; Kohlberg, 1984). Loevinger's Sentence Completion Test assesses stages in the conception of identity, self, and ego; hence it is another measure of social-cognitive development (see Loevinger, 1976). The Strong-Campbell Interest Inventory (SCII) surveys personal and vocational interests. The standard IQ verbal sub-tests taken from the WAIS provide a measure of crystalized intelligence; they may also measure fluid intelligence (Cattell, 1963).

All instruments were scored by trained and reliable scorers. The SCII was sent to a commercial service for scoring and interpretation. The remainder of the instruments were scored by trained advanced graduate and undergraduate students who were members of the research team.

Results

Preliminary data analysis of the relationship between social-cognitive development in the two social sub-domains of justice judgment and ethical evaluation (as assessed through the MJI-A and the GLI), personal, educational, and vocational interests and experiences (as assessed through the SCII), and performance on standard measures of intelligence (as assessed both through the subjects' self-reported IQ scores and through their performace

on the written verbal sub-tests taken from the WAIS) yields the following results:

MORAL JUDGEMENT INTERVIEW-A

As shown in Table 1, the mean Moral Maturity Score (MMS) for the entire sample was 390.68, with a standard deviation of 27.87. The MMS is a continuous score that represents the structural stage of the individual's reasoning about justice, as assessed in terms of Kohlberg's (1984) six-stage sequence of moral development (see Colby & Kohlberg, in press). The MMS scores ranged from 305 to 486 for the entire sample (on a scale from 100 to 500). The median MMS score was 394. There were no significant sex differences on the MJI-A (male mean MMS = 392.61, female mean MMS = 388.34, $t(142) = .9$ $p = .37$).

GOOD LIFE INTERVIEW

The mean Ethical Maturity Score (EMS) for the entire sample was 372.30, with a standard deviation of 40.48. The EMS is a continuous score that represents the structural stage of the individual's reasoning and evaluation about the value of "the good," as assessed in terms of Armon's (1984) five-stage sequence of ethical development. The EMS scores ranged from 295 to 475 for the entire sample (on a scale from 100 to 500). The median score was 375. There were no significant sex differences between males' and females' scores on reasoning about the Good-Life (male EMS mean=379.10, female mean EMS = 365.71, $t(122) = 1.86$, $p < .07$).

STRONG-CAMPBELL INTEREST INVENTORY

As shown in Table 2, the SCII yields scores along six scales or dimensions that correspond to the six "general occupational themes" identified by Holland (1966, 1973). These six themes represent, in some sense, vocational

personality types, and capture personal and occupational interests and proclivities. The mean, standard deviation, range for this sample, and possible range on each of the six dimensions is reported below:

Realistic: mean = 49.15, SD = 12.01, sample range was 27-75, possible range was 27-75.

Investigative: mean = 55.65, SD = 9.05, sample range was 29-69, possible range was 20-69.

Artistic: mean = 53.03, SD = 9.04, sample range was 27-67, possible range was 24-67.

Social: mean = 42.91, SD = 10.59, sample range was 20-70, possible range was 19-73.

Enterprising: mean = 46.12, SD = 8.59, sample range was 30-72, possible range was 30-77.

Conventional: mean = 50.59, SD = 10.77, sample range was 29-75, possible range was 23-79.

WAIS IQ:

The mean of the self-reported IQ scores for the entire sample was 145, with a standard deviation of 9.26 as shown in Table 3. The self-reported IQ scores for the entire sample ranged from 131 to 170, with a median of 149. The mean of the IQ scores as assessed using a written version of the verbal sub-tests from the WAIS was 136.67, with a standard deviation of 9.13. These scores ranged from 110 to 159 across the entire sample, with a median of 137. Finally, the correlation between the self-reported IQ scores and the IQ scores from the written verbal sub-tests was $r = .09$, $p < .39$.

RELATIONSHIPS OF INTEREST:

1) The relationship between social-cognitive development across various social sub-domains is shown in Table 1:

The relationship between the developmental scores in the social sub-domains of justice reasoning and ethical evaluation was assessed through the correlation between the MJE scores and the EMS scores: $r = .31$, $p < .0006$.

2) The relationship between social-cognitive development in these domains and personal, educational, and vocational interests and experiences is shown in Table 4:

This relationship was assessed through the correlation between the scores on the six Holland scales from the SCII and the MJE scores and EMS scores, respectively:

Holland Type	MJE	EMS
Realistic	$r = .11$, ns	$r = .16$, $p < .09$
Investigative	$r = .22$, $p < .0085$	$r = .34$, $p < .0001$
Artistic	$r = .21$, $p < .0140$	$r = .17$, $p < .0558$
Social	$r = .35$, $p < .0000$	$r = .11$, ns
Enterprising	$r = -.003$, ns	$r = .02$, ns
Conventional	$r = -.04$, ns	$r = -.07$, ns

3) The relationship between development in these domains and performance on standard measures of intelligence is shown in Table 5:

The relationship between development in the two social sub-domains of justice reasoning and ethical evaluation and performance on standard measures of intelligence was assessed through the correlation between both self-reported and written verbal sub-scales IQ scores and MJE and EMS scores:

IQ	MJE	EMS
self-reported	$r = -.16$, $p < .07$	$r = -.01$, ns

verbal sub-scales	r = .07, ns	r = .24, p < .007

Discussion

The preliminary nature of these analyses lend themselves only to very tentative conclusions. Perhaps the most important finding with respect to this sample is that the scores on the MJI-A and the GLI do not generally represent scores in the postformal or post-conventional range, but rather represent scores that, for the most part, are solidly in the conventional range. As such, these scores are very similar to such scores from other adult populations in the US, which tend also to be in the conventional range (i.e., MMS and EMS scores from 300-400) (see Armon, 1984; Colby, Kohlberg, Gibbs, & Lieberman, 1983; Kohlberg, 1984). There are subjects in this sample, as there are other adult samples, that score in the 425-500 range on MMS and EMS, which represents the postformal or post-conventional range. These subjects, however, are in the minority in this sample, with respect to both the MJI-A and the GLI (12 subjects score 425 or higher on the MJI-A, and 18 subjects score 425 or higher on the GLI).

These findings with respect to the social sub-domains of justice judgment and ethical evaluation suggest that high IQ is not a reliable predictor of postformal social-cognitive competence in these domains. In fact, the correlation between IQ score and both MMS and EMS scores was negative for the self-reported scores, suggesting that for some reason as self-reported IQ score increased MMS and EMS scores decreased. The findings are somewhat different for the IQ scores from the written verbal sub-tests, which show a postive but non-significant correlation between IQ and MMS, and a positive and significant correlation between IQ and EMS. Thus IQ from the written verbal sub-tests does appear to be a possible predictor of development in

the social-sub domain of ethical evaluation.

These findings suggest that there are important differences both between the self-reported and written verbal sub-test IQ scores, and between social-cognitive development in the sub-domains of justice judgment and ethical evaluation. The difference between the self-reported IQ scores and the scores from the verbal sub-tests from the WAIS is quite striking, especially since the correlation between the two scores is only $r = .09$. This essentially throws both types of IQ score into question, because, on the one hand, we have no way of checking the accuracy of the self-reported IQ scores, and, on the other hand, the written verbal sub-tests taken from the WAIS were not initially designed to be written, and hence a lack of interview probing and a lack of control over cheating may have negatively effected the accuracy of these scores.

The relationship between social-cognitive development in the sub-domains of justice judgment and ethical evaluation appears to be a complicated one. The correlation between MJS and EES scores is positive and significant ($r = .31$, $p < .0006$). The two scores, however, do not correlate similarly to IQ as assessed from the verbal sub-tests (EES does correlate significantly, but MJS does not). Hence in this sample there is a relationship between IQ and ethical evaluation that does not exist for IQ and justice judgment. Thus ethical evaluation as measured by the CLI may have more to do with crystalized intelligence as measured by the written verbal sub-tests than justice judgment, even though both are considered to be cognitive competencies in the social domain.

Finally, the relationship between development in these two sub-domains and personal and vocational interests as assessed using the SCII is also

complicated. The significant correlations between MMS and the Investigative, Artistic, and Social Holland vocational personality types seem to suggest that individuals with these personality characteristics and interests are more likely to score highly on the MJI-A than individuals who do not have these characteristics and interests.

In addition, the fact that the Social type correlates most highly and most significantly with MMS provides important support for the claim that justice judgment is a cognitive competence in the social domain. On the other hand, the fact that EMS correlates significantly only with the Investigative type again suggests that the GLI measures a different kind of social-cognitive competence than does the MJI-A. It also suggests that ethical evaluation may be less strongly within the social domain than justice judgment; in fact, it may be closer to a strictly logical skill. In any event, these preliminary findings suggest that the relationship between vocational personality type as assessed through the SCII and Holland's typology may prove to be a very interesting and fruitful area for further investigation.

In conclusion, it is important to acknowledge some very important caveats about this sample and this study. First, this sample is a unique one. Not simply because of their high IQ, but also because they are, in a sense, doubly self-selected with respect to this study. All of the subjects of this study selected themselves by electing to join the MENSA organization. In addition, they also self-selected themselves by volunteering to participate in this study and taking the time to fill out the battery and return it to us. This double selection may represent a high social-desirability or social-responsibility characteristic on the part of these subjects that may

then have an effect on the social scores they yield. In any case, it strongly suggests that this may not be a fully representative sample either of adults in the U.S., highly intelligent adults, or even MENSA members.

Second, all of these intruments were self-administered. As mentioned above, most of these instruments (with the exception of the SCII) were not originally designed to be self-administered. They were modified for the purposes of this study, but, especially with respect to the written verbal sub-tests from the WAIS, there is some question with respect to the reliability and validity of the scores that these written instruments yielded.

Finally, it is important to stress again that these analyses are preliminary. Further analyses, such as factor analyses on all of the scores, and regression and correlational analyses controlling for various variables, will be conducted. In addition, further analyses will include the results from the instruments assessing cognitive development in the logical-mathematical-scientific domain, in order to compare cognitive competence in that domain with the competencies assesssed and reported here in the social sub-domains. Such a comparison will be crucially important as we continue to investigate and attempt to understand the development of adult cognition within and across domains.

References

Alexander, C. N., Langer, E. J., & Oetzel, R. M. (in press). Beyond formal operations: Alternative endpoints to human development. New York: Oxford University Press.

Armon, C. (1984). Ideals of the good life and moral judgement: Ethical reasoning across the life-span. In M. L. Commons, F. A. Richards, & C. Armon (Eds.), Beyond formal operations: Late adolescent and adult cognitive development. New York: Praeger.

Campbell, D., & Hansen, J. (1981). Manual for the SVII-SCII: Strong-Campbell interest inventory. Palo Alto: Stanford University Press.

Colby, A., & Kohlberg, L. (Eds.). (in press). The measurement of moral judgment: Standard form scoring manuals. New York: Cambridge University Press.

Colby, A., Kohlberg, L., Gibbs, J., & Lieberman, M. (1983). A longitudinal study of moral judgment. Monographs of the Society for Research in Child Development, 48(1-2, Serial No. 200).

Commons, M. L., & Farrell, E. (1984). The formal-operational balance problem: Instructions and scoring manual. Unpublished manuscript, Harvard University.

Commons, M. L., Richards, F. A., & Armon, C. (Eds.). (1984). Beyond formal operations: Late adolescent and adult cognitive development. New York: Praeger.

Commons, M. L., Richards, F. A., & Kuhn, D. (1982). Systematic and metasystematic reasoning: A case for levels of reasoning beyond Piaget's stage of formal operations. Child Development, 53, 1058-1068.

Eysenk, H. J. (1981). The intelligence controversy. New York: Wiley.

Herrnstein, R. J. (1973). I. Q.: Social goals and the genetic heresy. Transactions and Studies of the College of Physicians of Philadelphia. 4 Ser., Vol. 40, No. 4, April.

Holland, J. L. (1966). The psychology of vocational choice. Waltham, MA: Blaisdell.

Holland, J. L. (1973). Making vocational choices: A theory of careers. Englewood-Cliffs, NJ: Prentice-Hall.

Inhelder, B., & Piaget, J. (1958). The growth of logical thinking from childhood to adolescence: An essay on the development of formal operational structures. New York: Basic Books.

Kohlberg, L. (1984). Essays in moral development, vol. II: The psychology of moral development. San Francisco: Harper & Row.

Kramer, D. (1983). Post-formal operations? A need for further conceptualization. Human Development, 26, 91-105.

Kuhn, D. (Ed.). (1979). Intellectual development beyond childhood. San Francisco: Jossey-Bass.

Kuhn, D., Pennington, N., & Ledbetter, B. (1983). Adult thinking in developmental perspective. In P. Baltes & O. Brim (Eds.), Life-span development and behavior. Vol. 5. New York: Academic Press.

Loevinger, J. (1976). Ego development. San Fransisco: Jossey-Bass.

Loevinger, J., & Wessler, R. (1970). Measuring ego development. San Francisco: Jossey-Bass.

Pascual-Leone, J. (1980). Constructive problems for constructive theories: the current relevance of Piaget's work and a critique of information-processing simulation psychology. In R. Kluwe & H. Spada (Eds.), Developmental models of thinking. New York: Academic Press.

Richards, F. R., & Commons, M. L. (in press). Postformal cognitive-developmental research: Some of its historical antecedents and a review of its current status. In C. N. Alexander, E. J. Langer, & R. M. Oetzel, (Eds.). Beyond formal operations: Alternative endpoints to human development. New York: Oxford University Press.

Wechsler, D. (1955). Wechsler Adult Intelligence Scale. New York: The Psychological Corporation.

Table 1

	Moral Maturity Score	Ethical Maturity Score
Mean	390.68	372.30
SD	(27.87)	(40.48)
Possible Range	100-500	100-500
Sample Range	305-486	290-475
Median	394	375
Male Mean	392.61	379,10
Female Mean	388.34	365.71
t: M vs. F	t(142) = .9	t(122) = 1.86
	ns	p < .07

r = .31, p < .0006

Table 2

Holland Type	Realistic	Investigative	Artistic	Social	Enterprising	Conventional
Mean	49.15	55.65	53.03	42.91	46.12	50.59
SD	(12.01)	(9.05)	(9.04)	(10.59)	(8.59)	(10.77)
Possible Range	27-75	20-69	24-67	19-73	30-77	23-79
Sample Range	27-75	29-69	27-67	20-70	30-72	29-75

Table 3

	Self-Reported IQ	Written Verbal sub-scale IQ
Mean	148	136.67
SD	(9.26)	(9.13)
Sample Range	131-170	110-159
Median	149	137

r = .09, ns

Table 4

Holland Type	Moral Maturity Score	Ethical Maturity Score
Realistic	r = .11, ns	r = .16, p < .09
Investigative	r = .22, p < .0085	r = .34, p < .0001
Artistic	r = .21, p < .0140	r = .17, p < .0558
Social	r = .35, p < .0000	r = .11, ns
Enterprising	r = -.003, ns	r = .02, ns
Conventional	r = -.04, ns	r = -.07, ns

Table 5

IQ Score	Moral Maturity Score	Ethical Maturity Score
Self-reported	r = -.16, p < .07	r = -.01, ns
Verbal sub-scales	r = .07, ns	r = .24, p < .009